

PATENT

INSTITUT FRANÇAIS DU PETROLE

**METHOD OF FORMING A MODEL REPRESENTATIVE OF THE  
DISTRIBUTION OF A PHYSICAL QUANTITY IN AN UNDERGROUND  
ZONE, FREE OF THE EFFECT OF CORRELATED NOISES CONTAINED IN  
EXPLORATION DATA**

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ABSTRACT

- Method of forming, from data obtained by exploration of a zone of a heterogeneous medium (an underground zone for example), a model representative of the distribution in the zone of at least one physical quantity amply free of the presence of correlated noises that may be contained in the data.
- The method essentially comprises the following stages :
  - acquisition of data giving information about certain characteristics of the zone,
  - specification of a modelling operator which associates the response of the model with a model (synthetic data),
  - modelling of each correlated noise by applying a specific modelling operator to a noise-generating function (n.g.f.),
  - specification of a semi-norm in the data space,
  - specification, in each n.g.f. space, of a norm for which each noise modelling operator constitutes an isometry, and
  - seeking, by an algorithmic method taking advantage of these isometry properties, the model and the n.g.f. which minimize a cost function quantifying, by means of the semi-norm, the difference between the measured data and the superposition of the response of the model and of the noises associated with the n.g.f.
- Application : for example seeking the distribution, in an underground zone, of the acoustic impedance, of propagation velocities, of permeabilities, etc.